

GOVERNMENT OF ANDHRA PRADESH

ABSTRACT

Infrastructure and Investments Department – AP Maritime Board –
Formulation of Guidelines for survey, certification and operation of existing
Inland Vessels operating in sheltered waters – Orders –Issued.

INFRASTRUCTURE & INVESTMENT (PORTS) DEPARTMENT

G.O.MS.No. 10

Dated: 08-09-2020.
Read the following:

1. G.O.Ms. No.26 I&I (Ports-I) Dept., 8-11-2017.
2. G.O.Ms.No.14, I&I (Ports-2) Dept. dated 08-06-2018.
3. G.O.Ms.No.10, I&I Department dated 17-1-2020.
4. From CEO, APMB Letter No.CEO/D2/3394/2017, dt.12-06-2020 addressed to IMU.
5. From CEO,APMB Lr.No.CEO/D2/3394/2017, dt:02-09-2020.

& & &

ORDER:

In the reference 5th read above, the CEO, APMB has stated that Government have issued AP Inland Vessel Rules 2017 based on the 2013 model inland water way authority rules in the G.O. first read above. AP Port department is designated and empowered with the registration and licensing of Inland vessels in the G.O. 2nd read above. Government of Andhra Pradesh have also established A.P. Maritime Board under A.P. Maritime Board Act, 2019 under A.P. Act 16 of 2019. The establishment of A.P. Maritime Board is in replacement of the A.P. Ports Department and all functions and powers of Ports Department are conferred on A.P. Maritime Board. Orders were also issued approving Standard Operating Procedures for issuance of registration to the water sports crafts/vessel in the G.O. 3rd read above.

2. The C.E.O., APMB has also stated that earlier to the issue of the above A.P.I.V. Rules, 2017, the boats and launches plying in the rivers, canals, reservoirs etc., (sheltered waters) were being registered under A.P. Canals and Public Ferries Act, 1890. Consequent on the issue of A.P. Inland Vessel Rules, 2017, the renewals of these boats/launches are to be done in accordance with the A.P. I.V. Rules. He stated that the said rules envisage higher specifications for boats and launches which were being operated before commencement of these rules in the river waters etc. He further stated that as a matter of fact these rules are mainly prepared keeping in view both river and sea operations and such higher specifications may not be required for the vessels that are operating in the rivers and sheltered waters. Most of the vessels registered under A.P. Canals and Public Ferries Act, were plying in the river and canals for decades together.

3. The CEO, APMB has stated that under Rule 1.3.1 of I.V. Rules, 2017 the Government is empowered to exempt from the application of all or part of the Rules, vessels or classes of vessels operating on navigable waterways as designated by the Government, where it considers that the sheltered nature

and conditions of such operations are such as to render the application of any specific provisions of the Rules unreasonable or unnecessary.

4. Further the general exemption for a period of 24 months provided for under Rule 1.3.1.(b) boats from application of these rules is over and that since the operations were stopped causing not only heavy loss but also lot of hardship to the operators and the crew working under them. Further the impaired water transport system in the rivers and canals for both public and cargo causing lot of inconvenience to the people in remote areas where water transport is the only means of transportation.

5. The CEO, APMB has further stated that though the State Government is empowered to exempt vessels or classes of vessels operating on navigable sheltered nature of waters from application of these rules, obviously allowing such existing vessels also should conform to certain minimum safety standards to avoid any possible contingencies or mishaps in operations an expert body Indian Maritime University (IMU) has been consulted to render technical support & knowledge sharing in the maritime issues with the Andhra Pradesh Maritime Board and to guide in formulating the standards to meet the requirements for the existing operating vessels. He has reiterated certain parameters inscribed in the said guidelines

6. IMU have stated that after studying the relevant circulars of D.G. Shipping and taking into account the relevant standards adopted in similar situations elsewhere which can be applied/adopted to the existing boats enabling their operation with or without additional constraints and with the aim of establishing minimum standards for safety of the boat and its passengers on various aspects including the applicability have formulated Guidelines for survey, certification and operation of existing inland passenger vessels operating in sheltered waters.

7. The CEO, APMB has constituted a Committee consisting of Port Officers, Machilipatnam and Kakinada and Chief Surveyor, for suggesting amendments in a comprehensive manner to the A.P. Inland Vessel rules, have felt that the guidelines formulated by Indian Maritime University, Visakhapatnam for certification and operation of existing Inland Passenger/Cargo vessels operating in sheltered waters of the State are crucial and suffice to resolve the present contingency in renewing the existing vessels/boats and recommended to approve the same invoking the powers conferred under Rule 1.3.1. of A.P. I.V. Rules, 2017.

8. The CEO, APMB has requested the Government to exempt the existing inland passenger/cargo vessels operating in sheltered waters (rivers, lakes, canals and reservoirs etc.,) from application of A.P. I.V. Rules, 2017 invoking Rule 1.3.1 of the said rules, and adopt the Guidelines prepared by Indian Maritime University, Visakhapatnam Campus, for Survey, Certification and Operation of existing Inland Passenger Vessels operating in Sheltered Waters, immediately to operationalize the existing boats meeting the above standards

9. Government after careful examination of the matter, hereby exempt the existing inland passenger/cargo vessels operating in sheltered waters (rivers, lakes, canals and reservoirs etc.) from application of Andhra Pradesh

Inland Vessel Rules, 2017 invoking the powers conferred under rule 1.3.1. of the said rules and permit to adopt the Guidelines prepared by Indian Maritime University, Visakhapatnam Campus, for Survey, Certification and Operation of existing Inland Passenger Vessels operating in Sheltered Waters which are appended hereto as ANNEXURE, with immediate effect.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

R. KARIKAL VALAVEN
SPECIAL CHIEF SECRETARY TO GOVERNMENT

To
The Chief Executive Officer, A.P. Maritime Board, Kakinada.
The Registrar, Indian Maritime University, Visakhapatnam campus,
Visakhapatnam
Copy to:
The Special Chief Secretary to Govt.,
Water Resources Department, A.P. Secretariat, Velagapudi.
The Special Chief Secretary to Govt., YAT & C Department, A.P. Secretariat,
Velagapudi
The OSD to Secretary to Honourable to C.M.
The OSD to Minister for Tourism for information
OSD to Minister for Industries, Investments & Infrastructure for information.
The Managing Director, APTDC for information and necessary action
PS to Spl.CS to Govt.

//FORWARDED BY ORDER//

SECTION OFFICER



**Guidelines For Survey, Certification And
Operation Of Existing Inland Passenger Vessels
Operating in Sheltered Waters**

**Indian Maritime University
Visakhapatnam Campus**

01 September 2020

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Background:

Government of AP has issued AP inland Vessel Rules 2017 based on the 2013 model rules prepared by inland waterways authority of India (IWAI). Under those Rules, AP Port department is designated and empowered with the registration and licensing of inland vessels for improving effective inland water transport, which avoids congestion on road and rail transport. In this backdrop, the said rules envisages higher specification for registration of inland Vessels than that of the Canal & Public Ferries Act, which was in force before commencement of these rules. However, these rules are mainly prepared keeping in view both river and sea operations, such stringent requirements may not be required as the vessels are operating in the rivers and sheltered waters. Most of the vessels registered under Ferries Act ply in the lakes, rivers, canals and reservoirs only. However consequent on the introduction of IV rules 2017, the renewals of those vessels have become the responsibility of Ports Department. Exemption for the compliance of the boats in the said rules was given for 2 years and now all the registrations of all the boats, which were not complying with these rules, were cancelled as the exemption period of 2 years has expired. This move has impaired the water transport system in the rivers and canals for both public and cargoes.

One of the difficulties faced is the lack of data pertaining to hull form (for hydrostatics) and lightship weight to carry out the computations of stability etc. In order to generate this data each of these boats will have to be measured and data to be generated. This process will take time and eventually must be done. It is therefore become necessary to develop some guidelines for carrying out certificate of survey, which includes verification of stability and strength for all existing Inland vessels including ferries & tourist boats carrying more than 12 passengers so that the boats can be operated with some minimum standards of safety of the vessel and its passengers.

The guidelines for establishing minimum safety levels has been arrived at considering that most of the passenger vessels operate in sheltered waters (rivers, lakes and reservoirs) where the maximum significant wave height is not likely to exceed 0.3 m.¹ Accordingly it is suggested to establish a Zone 4 with maximum significant wave height of 0.3 m, which may be applied to the existing boats enabling their operation with or without additional constraints.

This document is divided into two parts

Part A: Analysis of Zones as defined in AP IV rules (GO26) and putting forward an argument for establishing Zone 4 with 0.3 m as the maximum significant wave height or in other words sheltered waters.

Part B: Some important guidelines for Passenger vessels operating in sheltered waters.

DISCLAIMER:

These guidelines are intended to establish some minimum standards of safety for the exiting boats operating in sheltered inland waters such as rivers, lakes

¹ISO 12217/12215 definition of sheltered waters.

and reservoirs of the state of AP. These guidelines are also based to a large extent on standards available and practices followed elsewhere. The purpose of these guidelines is to facilitate certification for those boats complying with these minimum standards. These guidelines do not guarantee absolute safety at all times. The owner and the master of the vessel shall be responsible for safe operation of the boat taking into the environmental conditions, currents, wind & weather, and application of principles of good seamanship and engineering judgment so as to achieve safety in operations and protection of the environment. IMU is not responsible for any accidents /loss of life arising out of application of these guidelines.

Review:

These guidelines must be reviewed as and when possible but at least annually based on the experience gained out of the implementation and modified if necessary.

Part A

1. Inland Vessel's Act (1917) as amended

The IV act of 1917 as amended gives the following definitions "inland vessel" or "inland mechanically propelled vessel" means a mechanically propelled vessel, which ordinarily plies on inland water, but does not include fishing vessel and a ship registered under the Merchant Shipping Act, 1958 (44 of 1958)²;

"Inland water" means—

- (i) Any canal, river, lake or other navigable water within a State,
- (ii) Any area of any tidal water deemed to be the inland to be smooth and partially smooth by the Central Government under section 70 of this act,
- (iii) Waters declared by the Central Government to be smooth and partially smooth waters under clause (41) of section 3 of the Merchant Shipping Act, 1958 (44 of 1958)³;

Inland mechanically propelled vessel not to proceed on voyage or to be used for service without certificate of survey.—

(1) An inland mechanically propelled vessel shall not proceed on any voyage, or be used for any service unless she has a certificate of survey in force in the zone intended for operation and applicable to such voyage or service in such zone.

Explanation. —For the purpose of this sub-section, "zone" means any such inland water area as the State Government may, depending on the maximum significant wave height criteria, by notification in the Official Gazette, specify for the purpose of this Act.⁴

²Section 2 [1] (a) of IV act.

³*Ibid* (b)

⁴Section 3 [1] of IV Act

It is very clear that as per the IV act, the basis for issuing a certificate is the zone, which is decided by the parameter Maximum Significant Wave height (h_s) as decided by the State Government.

Significant Wave Height⁵:

Significant wave height (H_s) is usually defined as the average height of the highest one-third waves in a wave spectrum.

Each dot in figure 1 above represents the number of waves (N) in the spectrum with a height of H . The graph shows there are a relatively low number of small waves (left side of graph) and a low number of very large waves (right side of graph). The greatest number of waves (N) in this spectrum falls in the mid range of heights (centered under H_m). The highest one-third (33.3%) number of waves in this spectrum is shaded on the graph. The average height of waves in this shaded group is the significant wave height, H_s .

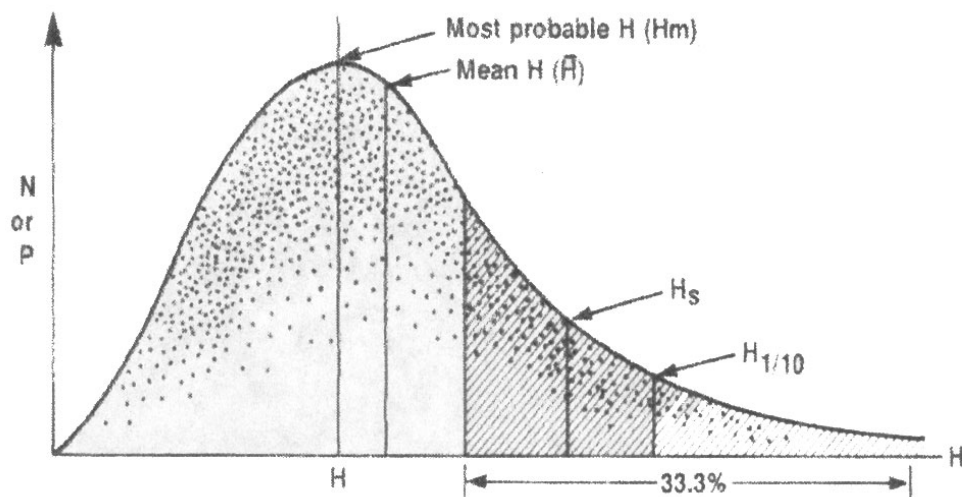


Figure 1: The statistical distribution of wave heights showing various parameters (from Bretschneider, 1964)

Also shown are the mean wave height (H), most probable wave height (H_m), and the height of the highest 10% of waves ($H^{1/10}$). The mean wave height H is approximately equal to 2/3rds (0.64) the value of $H^{1/3}$ and $H^{1/10}$ is approximately equal to 1.27 times the value of H_s . In addition, the height of the highest 1% of waves ($H^{1/100}$) is approximately equal to 1.67 times H_s , and a theoretical maximum wave height (H_{max}) is approximately equal to two times H_s .

The definition of significant wave height under normal circumstances may be considered as average of the highest one-third of the number of waves and is often denoted as $H^{1/3}$.

Operating Areas and Significant Wave Height

⁵ https://www.vos.noaa.gov/MWL/apr_06/waves.shtml

AP Government Inland Vessel Rules 2017:

The Andhra Pradesh State Government has promulgated the AP Government inland Vessel Rules in 2017. In accordance with the rules

'Operating Areas' For the purpose of these Rules where applicable, the inland waterways operating area is divided as follows:

- a) Zone-1: A zone where maximum significant wave height does not exceed 2.0 meters
- b) Zone-2: A zone where maximum significant wave height does not exceed 1.2 meters
- c) Zone-3: A zone where maximum significant wave height does not exceed 0.6 meter

The term significant wave height has to be accompanied with the way it has to be calculated even though it is commonly understood that it is the average of the highest 33% of the waves.

Classification of inland water ways in the European Union

The European Union also classified the inland waterways as Zones 1, 2, 3 & 4 on the basis of significant wave height. However the EU in their definition of "significant wave height have interpreted the same as "the average of heights of 10% of the total number of waves having the greater heights measured between wave trough and wave crest, observed over a short period", for which commonly the notation $H^{1/10}$ is used⁶. This definition for the significant wave height is rather unusual (and therefore confusing), as most commonly $H^{1/3}$ is considered in this respect. Assuming that the wave height population follows a Rayleigh distribution, $H^{1/10} = 1.27 H^{1/3}$, which implies that the boundaries for the navigation zones defined by EU are given by the following values⁷:

Zone 1: $H^{1/10} < 2.0$ m; $H^{1/3} < 1.57$ m

Zone 2: $H^{1/10} < 1.2$ m; $H^{1/3} < 0.94$ m

Zone 3: $H^{1/10} < 0.6$ m; $H^{1/3} < 0.47$ m

Zone 4: Navigation in waters with insignificant wave height.

The classification societies also have their own notations for classification of inland vessels. Usually the class notation is given for a vessel to operate in a Zone on the basis of the detailed analysis of the design. While Indian register of shipping (IRS) also have zone identification similar to AP IV rules, the Lloyds register has Zones 1 and 2, defined as zones where the maximum significant wave height based on long-term statistics, excluding the highest 5% of the observed waves, does not exceed 1.6 m and 1.0 m, respectively. An inland vessel without zone notation can operate in Zone 3, characterized in a similar way by a maximum significant wave height of 0.5 m excluding highest 5% of the waves. This is similar to Zone 3 of EU⁸.

⁶ Economic Commission for Europe resolution no 61 E 2006 & 2011

⁷ "Inland vessels at sea, a useful contradiction to solve missing links in waterway systems"; Vantorre M et al/ PIANC conference paper "Smart Rivers 2013".

⁸ Rules and regularisation for classification of Inland waterways ships, Lloyds Register

There are a number of boats used for recreational purpose in the inland waters of the EU as well as in the ocean, which are owned by individuals and also carry passengers. The numbers of such boats used for recreational purposes and for transportation of passengers operating in lakes and rivers where the wave height is insignificant are is very high and so a different mechanism had to be adopted to ensure the safety of such crafts. Such a mechanism has been incorporated in the form of recreational craft directive of the EU. Based on the same ISO has framed standards for construction (ISO 12215 series) and stability (ISO 12217 Series). In accordance with ISO the following design categories are made as shown in table 1 below⁹:

ISO Design Category	A (Ocean)	B (Offshore)	C (Inshore)	D (Sheltered Waters)
Wave Height up to	$H^{1/3} = 7$ m approx.	$H^{1/3} = 4$ m	$H^{1/3} = 2$ m	$H^{1/3} = 0.3$ m (0.5 m Max)
Typical Beaufort wind force (Beaufort Number)	Upto 10	Upto 8	Upto 6	Upto 4
Calculation Gust Wind Speed (m/s)	28	21	17	13
Wind Speed range according to Beaufort Scale (m/s)	24.7-28.3	17.2 -20.5	10.8-13.6	5.6-7.8
Wind Descriptive Term	Storm	Gale	Strong Breeze	Moderate Breeze
Sea State Descriptive Terms	Very High	Very Rough – High	Rough	Slight-Moderate

Table 1 : Description of Design Categories as per ISO¹⁰ and their interpretation as per Beaufort scale.

It is pertinent to note that the wave height in Design category D ($0.3 \text{ m } H^{1/3}$) is not available in IRS or AP rules.

According to ISO¹¹, boats conforming to design category D ("sheltered waters") are considered suitable to operate in waters with significant wave heights up to and including 0,3 m with occasional waves of 0,5 m height, for example from passing vessels, and a typical steady wind force of Beaufort Force 4 or less. Such conditions may be encountered on sheltered inland waters, and in coastal waters in fine weather. Wind speeds are assumed to gust to 13 m/s.

Significant wave height for Type 1 Indian River Sea Vessels

The Indian Government, anticipating that reduction in the operation and construction cost of coastal vessels by defining a distinct river-sea vessel would encourage coastal shipping, inland water transport and trade as well as ship building and thus further the growth of the maritime sector has promulgated the river sea vessel rules (RSV rules). As per RSV rules a River

⁹ISO 12217-1

¹⁰*ibid*, ISO 12215-5 & Beaufort Scale as given in "Design Categories of Watercrafts"-2012 prepared by Directorate General of Internal policies of EU.

¹¹ISO 12215-5 & ISO 12217-1

sea vessel Type 1 is defined as follows:

Type 1, Ship to Shore Service: Vessels engages in ship-to-shore operations at Indian ports beyond inland water limits of the said port, provided that such operation is carried out in fair weather and against a favourable weather forecast. Vessels falling under this type while engaging on ship-to-shore operations at an Indian port shall operate within the territorial waters of India¹².

For construction of these vessels the structural strength shall not be below than that is required for a sea environment where the maximum significant wave height ($H^{1/3}$) is 2.0 meters¹³. This is equivalent to Zone 1 as per IRS and AP rules and equivalent to design category C of ISO 12217/12215.

Design categories of Indian Pleasure crafts

Design categories of Indian Pleasure crafts:

The Government of India notified the construction, survey, certification and operation of pleasure crafts having length (LOA) not more than 24 meters and carrying less than 12 passengers in 2016. In accordance with the notification the equivalence with design category of pleasure crafts with ISO 12217 has been established¹⁴. The design category comparison between the pleasure craft rules and ISO along with the significant wave heights and inland water zones can now be established as shown in the following table 2.

Permitted area of operation	Category of Pleasure craft as per DGS	ISO 12217 (12215) Design Category	Significant Wave Height ($H^{1/3}$) according to ISO	Zone Category as per AP IV rules
Unrestricted	1	A	$H^{1/3} = 7$ m approx.	Not Applicable
From Inland waters upto 24 miles from a safe haven	2	B	$H^{1/3} = 4$ m	Not Applicable
From Inland waters upto 12 miles from a nominated departure point	3	B	$H^{1/3} = 4$ m	Not Applicable
From Inland waters upto 1 mile from a nominated departure point in fair weather and daylight	4	C	$H^{1/3} = 2$ m	Zone 1

Table 2: Equivalence of design category between DGS please craft rules and ISO 12217 and IV rules

Inland water categories in the United Kingdom

The UK has also categorized inland waters and established equivalence with

¹²DG Shipping order no 18 of 2013

¹³*ibid*, section 4.2.1

¹⁴Section 2.3.9 of DG Shipping order no 7 of 2016

EU categorization¹⁵ as shown below:

UK Inland water Categories	Corresponding EU Inland water Zones
A -Narrow Rivers and canals where the depth of water is generally less than 1.5 meters	4 (Uncategorized)
B - Wider rivers and canals where the depth of water is generally 1.5 meters or more and where the significant wave height could not be expected to exceed 0.6 meters at any time.	3- Wave Height up to 0.6 m
C - Tidal rivers and estuaries and large, deep lakes and lochs where the significant wave height could not be expected to exceed 1.2 meters at any time.	2- Wave Height up to 1.2 m
D - Tidal rivers and estuaries where the significant wave height could not be expected to exceed 2.0 meters at any time.	1- Wave Height up to 2.0 m

Table 3: Comparison between inland water categorization in the UK and the EU

¹⁵ Annex 1 of Merchant Shipping Notice MSN 1879(M)

In the small passenger ships (less than 12 Pax) code of the United Kingdom¹⁶, it is mentioned that Categories A and B are generally coincident with the EU Recreational Craft Directive design category D– which refers to small lakes, rivers and canals where a significant wave height of up to, and including, 0.5m may be experienced and hence the design category D of ISO 12217/12215 is applicable to these boats. This implies that the significant wave height as a consideration for design is taken as 0.3 m maximum with occasional waves of 0.5 m height for example from passing vessels and a typical steady wind force of Beaufort 4 or less.

Summary

The various design categories for inland vessel operations with respect to maximum significant wave height, which may be experienced, can now be summarized in the following table 4:

UK Inland water Categories	ISO 12217/ 12215 Design Category	Corresponding EU Inland water Zones	RSV /Pleasure Craft Notification	AP IV Rules
A -Narrow Rivers and canals where the depth of water is generally less than 1.5 meters	D ($H^{1/3} = 0.3\text{m}$) with max 0.5 m	4 (Uncategorized)	Not Applicable	Not available
B - Wider rivers and canals where the depth of water is generally 1.5 meters or more and where the significant wave height could not be expected to exceed 0.6 meters at any time.	D ($H^{1/3} = 0.3\text{m}$) with max 0.5 m	3- Wave Height up to 0.6 m	Not Applicable	Zone 3
C - Tidal rivers and estuaries and large, deep lakes and lochs where the significant wave height could not be expected to exceed 1.2 meters at any time.	C ($H^{1/3} = 2.0\text{m}$)	2- Wave Height up to 1.2 m	Not Applicable	Zone 2
D - Tidal rivers and estuaries where the significant wave height could not be expected to exceed 2.0 meters at any time.	C ($H^{1/3} = 2.0\text{m}$)	1- Wave Height up to 2.0 m	Type 1/ Category 4	Zone 1

Table 4: Summary of comparison of significant wave heights and IV zones with ISO Design Category.

¹⁶ Inland waters small passengers boat code published by MCGA and Association of Inland Navigation Authorities, United Kingdom

Outward (sea ward) limits of Inland waters

The Ministry of External Affairs, Government of India, under the provisions of the Maritime Zone act have declared the baselines around the Indian coast including Lakshadweep and Andaman & Nicobar Islands.

In view of the above, Government of India under the provisions of section 2 of IV act 1917 as amended and clause 41 of section 3 of Merchant Shipping act as amended adopted the baseline as declared by the Ministry of external affairs as the limits of Inland waters and has consequentially declared partially smooth waters as an area having a significant wave height of 2.0 m¹⁷.

In order to facilitate seamless movement of maritime traffic in Indian Coastal waters, the inshore limits for inland vessels has been extended to 5 Nautical miles or up to 2.0 m of significant wave height condition which ever is less from the baseline during fair weather season i.e. from 1st December to 30th April in the Bay of Bengal and in fair weather conditions subject to inland vessels obtaining a statement of compliance¹⁸.

Thus all inland vessels designed to operate in Zone 1 conditions of IV rules can be considered to be fit to operate year round up to the IV limits (baseline as declared). These vessels can operate beyond the baseline up to 5 Nautical Miles in fair weather conditions.

Wind speed data:

In Andhra Pradesh, there are a number of boats, which are operating in rivers, canals and lakes and which do not go out to sea. The prominent places where these boats operate are Vijayawada and Rajahmundry. The average wind speed data has been obtained as available in the public domain¹⁹ for these places are as shown in Figures 2 & 3 respectively.

¹⁷DG shipping order No 19 of 2013.

¹⁸DG shipping Circular no 1 of 2015 and DG shipping order No 8 of 2018.

¹⁹<https://worldweatheronline.com>

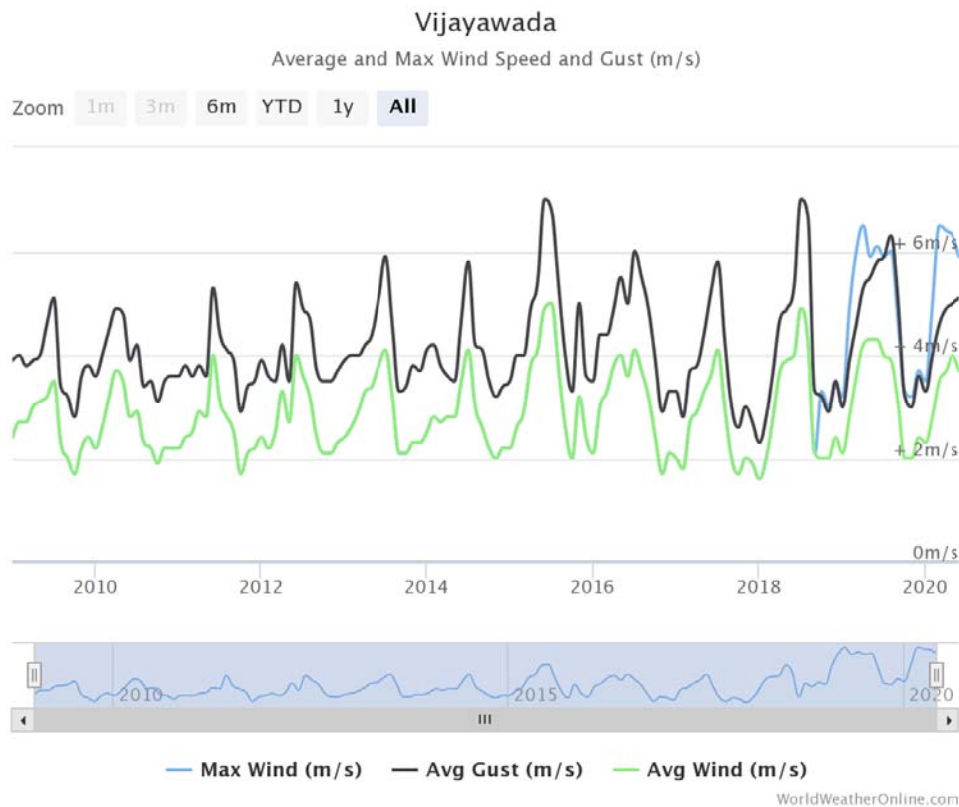


Figure 2: Average wind speed data in Vijayawada.

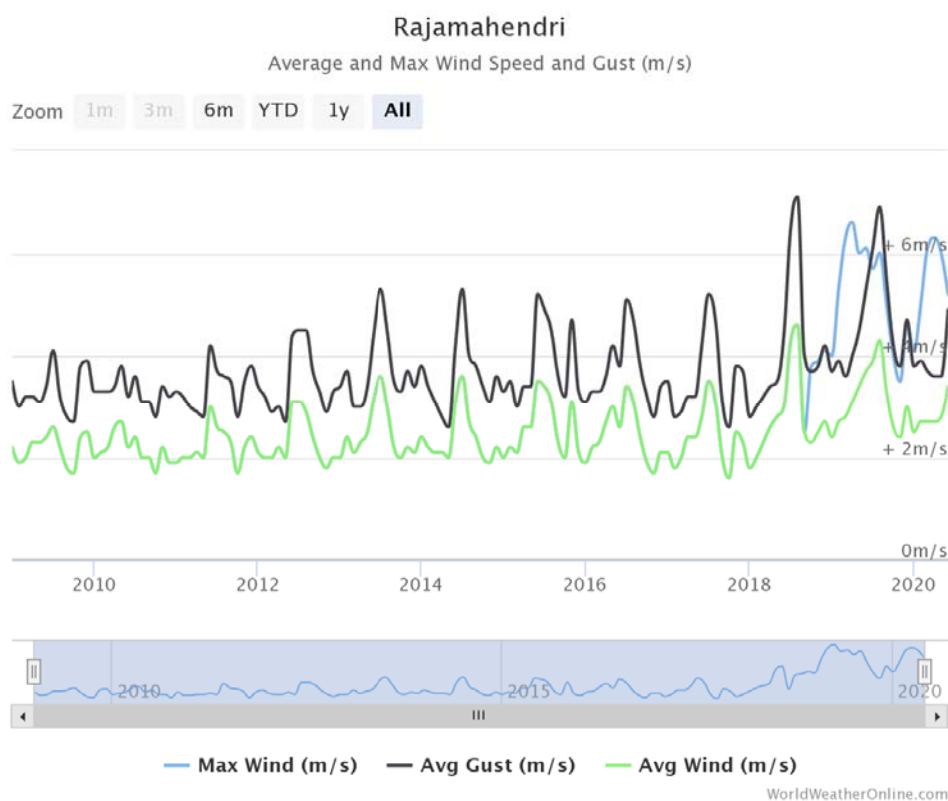


Figure 3: Average wind speed data in Rajahmundry.

It may be seen from the above that the maximum wind speeds recorded are in the range of 7.0 m/s. This is comparable to Beaufort 4 and falls into ISO design

category D (sheltered waters) as shown in table 1 above. The significant wave height for this category is 0.3 m with occasional waves of 0.5 m. This is significantly less than Zone 3 of AP IV rules.

Conclusion:

1. It is very clear from section 3(1) of Inland Vessel's act, that any mechanically propelled boat cannot undertake a voyage unless the boat is certified for operation in that zone. The zones are to be categorised as per significant wave heights by the respective state governments.
2. The significant wave heights adopted by EU are based on $H^{1/10}$ whereas the common understanding is $H^{1/3}$. It is therefore necessary to indicate the interpretation of the H_s in the rules.
3. The DG Shipping has in their notifications have allowed inland vessels certified to operate in significant wave heights ($H^{1/3}$) of 2.0 m to operate in inshore areas up to the baseline (declared IV limit) and even up to 5 nautical miles beyond the baseline in fair weather conditions. This can be considered as Zone 1 for IV rules.
4. Going inwards from Zone 1, the areas of tidal rivers and estuaries and large, deep lakes may have to be considered where significant wave height ($H^{1/3}$) of 1.2 m may be encountered. However in case of tidal areas of rivers and estuaries, any boat constructed will have better operational capabilities and range if it is designed for Zone 1. Thus Zone 2 is suitable only for boats, which have to operate in large enclosed lakes where there is a possibility of developing wave heights of 2.5 m ($2 * H^{1/3}$). The wind speed data for Srisailam is shown in Figure 4²⁰ below.

Max and Average Wind Speed and Wind Gust

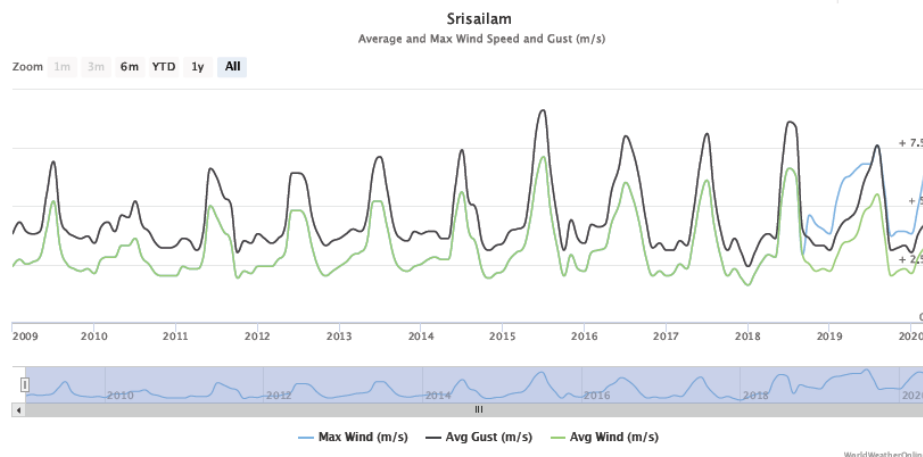


Figure 4: Wind speed data at Srisailam.

5. The data indicates that even in large lakes in the State of Andhra Pradesh the wind speed is in the range of Beaufort 4 only and thus corresponding to category D of ISO 12217/12215. Thus the utility of design category of Zone 2 ($H^{1/3} = 1.2$ m) is likely to be limited.

²⁰<https://worldweatheronline.com>

6. Unless there is substantial commercial utility for designing a vessel for Zone 2 only (limiting its operation in the sea up to the baseline or 5 NM in fair weather) is likely to be non utilized.
7. The next is Zone 3, which encompasses most of the navigable river, canals and lakes in the state. Most of the recreational and passenger boats in the state are in this category. However the requirement of 0.6 m as significant wave height ($H_{1/3}$) would be very high compared to the conditions as is evident from wind data.
8. If the zones in the model rules of IWAI / AP were defined by taking into account the inland zones as defined by EU into consideration, then Zone 3 would have be defined as one with maximum $H^{1/3}$ as 0.3 m or maximum 0.5m because the EU zones are defined as $H^{1/10}$ and not as $H^{1/3}$. It may be seen that even the United Kingdom has retained the definition of zone 3 as maximum 0.6 m significant wave height (category B as per MCGA – see table 3). However in the small passenger ships code the MCGA has provided equivalency of category B to ISO 12217-design category D (see table 4). It is to be noted that State of Kerala and the State of Bihar while framing their rules for inland waterways have not defined any Zones.
9. The AP government rules have for the purpose of survey categorized the inland vessels into two as follows²¹:
 - (a) Category A: All Inland Vessels constructed for operating/operating in Zone 1.
 - (b) Category B: All Inland Vessels other than Category A.
10. For new constructions, the vessels belonging to category A (Zone 1) the rules recommend that the vessels be constructed and maintained as per the rules of a classification society²² and that for other categories i.e. Zones 2 & 3 the vessels be constructed and surveyed as per a classification society's rules or in accordance with the rules framed by the State Government²³.

Recommendations

1. Because of interrelationship of Zone 1 with the D.G. Shipping circulars, the Zones as defined are assumed to be on the basis of significant wave heights ($H^{1/3}$). In order to cater to the boats operating in sheltered inland waters, it is recommended to add a Zone 4 as follows:

Zone 4: A Zone where significant wave heights ($H^{1/3}$) up to and including 0,3 m with occasional waves of 0,5 m height, for example from passing vessels, and a typical steady wind force of Beaufort Force 4 or less. Winds are

²¹Clause 2.2 of inland waterways GO 26

²²*ibid*, clause 2.7.1

²³*ibid* clause 2.7.2

assumed to gust to 13 m/s. There may be a restriction imposed on these boats from operating in winds exceeding Beaufort 4.

2. Equate Zone 3 with ISO 12217 /12215 Design category D for vessels less than 24 m and not carrying more than 12 passengers (similar to UK small pax vessel code).
3. It is understood that unlike the provisions of IV act 1917 as amended, the draft IV bill 2020 provides for categorization of vessels in 3 Zones similar to the existing AP Rules. It is necessary to
 - a) Define the term significant wave height in the proposed act as average of the highest 1/3 of the waves
 - b) Add a Zone 4 as indicated in 1 above.
4. Make provision for measurement of wave data by installing wave rider buoys and also wind speeds on a continuous basis in order to get real data for further refinement.

Part B:

This part gives the necessary guidelines taking into account the relevant standards adopted in similar situations elsewhere and which may be applied to the existing boats enabling their operation with or without additional constraints with the aim of establishing minimum standards for safety of the boat and its passengers.

Note: These guidelines needs to be replaced with new or additional requirements after the data is generated for each boat.

Docking of each passenger vessel plying in rivers, lakes and reservoirs is to be carried out within one year for measurement of accurate dimensions and lines plan, and for physical inspection of underwater areas and thickness measurements. This will allow evaluation of stability and strength aspects of each boat before finalizing the requirements for this category of boats.

1. Applicability
 - a) Clause 1.3.1 (a) of GO 26 states that vessels or classes of vessels operating on navigable waterways as designated by the Government, where it considers that the sheltered nature and conditions of such operations are such as to render the application of any specific provisions of the Rules unreasonable or unnecessary.
 - b) There are a number of boats operating in rivers, lakes and canals in the state of AP. These boats operate in sheltered waters where under normal operating conditions the average wind speed is less than Beaufort 4 (5.6 to 7.8 m/s). Under such circumstances the significant wave height is likely to be 0.3 m with the maximum wave height being around 0.5 m. These guidelines are pertaining to these limiting environmental conditions. It is

emphasised that operations must be stopped in case the conditions exceed Beaufort 4.

- c) It is assumed that by sheltered waters it is understood as waters, or areas of a body of water, within which the conditions are such that it is appropriate to apply some basic standards of safety to existing vessels operating thereon.
- d) For existing vessels, the operator should be able to demonstrate a recent history of safe operation in a similar or more onerous operating category by this vessel or a vessel of similar construction
- e) These guidelines are to be applied on steel self-propelled passenger boats/cargo passenger boats of welded construction plying in rivers, lakes and reservoirs of State of Andhra Pradesh only.

Structure:

Many of the boats have been in operation for a number of years. These guidelines incorporate minimum checks to be ensured for allowing them to operate further.

Plating²⁴:

- a) The thickness of the bottom and side plates, measured at any stage of the vessel service, shall be not less than the thickness determined from formulae (1) and (2) and in no case can be less than 4 mm:

$$t = 0.006a\sqrt{T} \text{ -----(1)}$$

$$t = 0.55f\sqrt{LWL} \text{ -----(2)}$$

Where:

t = thickness of plate in mm

a = spacing of plating stiffeners (longitudinal or transverse), [mm].

If longitudinal framing system is applied, the value of a , taken for the calculations, shall be not less than 400 mm.

$f = 1 + 0.0013(a - 500)$, where $a \geq 400$ mm shall be entered.

LWL – the length of the vessel measured on the waterline corresponding to draught T , [m].

²⁴ Section 7.6.5 of Rules for classification and construction of inland waterway vessels, Part 2 (Polish Register of shipping)

- b) The exemption from the above requirements may be permitted, provided that direct calculations of general, zone and local strength are made which show that the strength criteria, are complied with for the plating thickness values lesser than those determined from formulae (1) and (2). The plating thickness shall not, however, be less than 4 mm.
- c) Plates not complying with the above requirements shall be replaced.
- d) Rubber tire fenders or equivalent are to be placed around the hull to minimise damage to the hull plating at the time of berthing.

Stiffeners:

Adequate stiffeners are to be provided at normal and web frames.

Subdivision

Decked Vessels

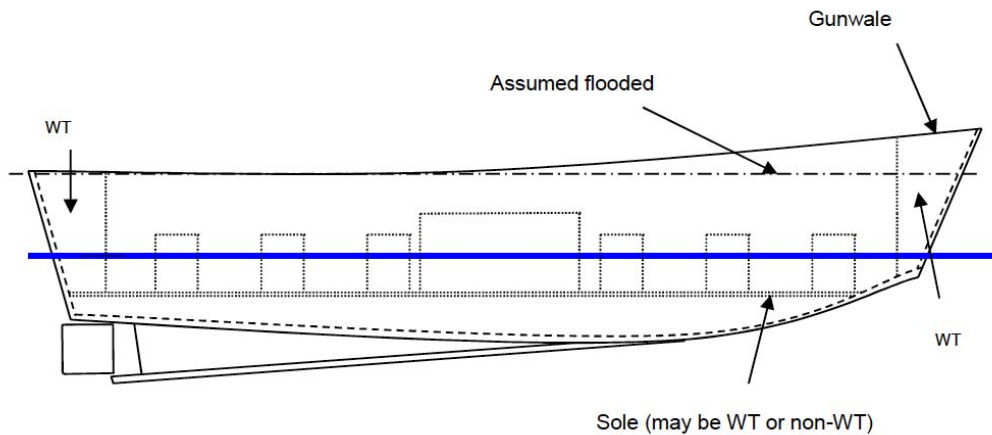
- a) For passenger vessels, the subdivision requirements are generally associated with compliance with damage stability requirements. For existing vessels, it is not known if they would meet even one compartment-flooding criterion. While effort should be made to assess each boat with respect to its stability in the damaged condition the following may be applied:
- b) Ideally, a collision bulkhead should be positioned at a distance of $0.04L$ to $0.04L+2$, [m], measured from the forward perpendicular in the load waterline plane.
- c) An aft-peak bulkhead must be provided at a suitable distance from the stern where the vessel length exceeds 25 m in such a way that the buoyancy of the laden vessel is ensured, with a residual safety clearance of 100 mm if water enters the watertight compartment aft of the aft peak bulkhead. As a general rule, the requirement referred to may be considered to have been met if the aft peak bulkhead has been installed at a distance of between 1,4 m and $0,04L + 2$ measured from the aft point of the intersection of the hull with the maximum draught line.
- d) Compliance with paragraph a) above may be considered as demonstrated if the watertight bulkheads are located in accordance with **Annexure 1**.
- e) If the existing vessels do not meet the criterion as above, the following guidance can be applied²⁵:

Length	Machinery Aft	Machinery Elsewhere
< 30m	3	3
>30	3	4

²⁵Section 1B, Chapter 5, Part B of GO26

Open Vessels

- a) Subdivision of open boats shall be specially considered. At least 2 bulkheads may be positioned forward and aft as shown in the figure.



The administration/chief surveyor may grant exemption from this requirement for at least 1 year. All such boats are not to operate in high currents or when the wind force is more than Beaufort 4.

- b) The number of passengers in open boats shall not exceed 60

Freeboard

Minimum Freeboard

- a) The minimum freeboard shall be that freeboard at which vessels in the maximum condition of loading meet the stability requirements as determined by a stability proof test, carried out in accordance with 0 or other requirements that the Administration considers appropriate in relation to the type of vessel, its service and its area of operation. The minimum freeboard shall not be less than 300 mm.
- b) Where the minimum freeboard of a loaded vessel occurs abaft a point 75% of the length of the vessel from the foreside of the foremost part of the vessel, excluding guardrails, the minimum freeboard shall be taken to be the freeboard measured at the 75% of the length point.
- c) The Administration may accept a lesser value of freeboard where the construction or the type of vessel makes it impracticable to achieve the above freeboard calculated as above.
- d) When demonstrating compliance with 0, the freeboard shall be taken as the vertical distance between the waterline at which the vessel is floating with maximum load on board and shall be measured:

1. For a flush deck or well deck vessel, to the top of the weather deck at the side of the vessel;
2. For a partially-decked vessel, to the top of the deck or to the top of the gunwale, whichever is the less; and
3. For a cockpit vessel or for an open vessel, to the top of the gunwale.

Loading Marks:

- a) Vessels shall have permanent loading marks placed on each side amidships to indicate the maximum allowable draft corresponding to the minimum freeboard determined according to 0.
- b) Such a loading mark shall be a horizontal line of at least 300mm amidships and 25mm in height, with its upper edge passing through the point of maximum draft. The loading mark shall be painted in a contrasting colour to the side shell paint.

Loading of vessels

The loading marks of a vessel shall not be submerged at any time when it departs on a voyage, during a voyage or on arrival.

General requirements relating to intact stability

In general, intact and damage stability requirements are verified by calculation and an inclining experiment. The hydrostatic particulars are required for performing such calculations. In the absence of the details of the hull form, hydrostatics and other relevant data, the stability of the vessels are best assessed by a Stability proof test

Vessels shall undergo a stability proof test in accordance with 0 in the presence of an Administration surveyor to determine that a vessel, as built and operated, has the appropriate level of initial stability.

Conduct of stability proof test²⁶

- a) Vessels shall be in the condition specified in b) to n) inclusive when a stability proof test is performed.
- b) Vessels shall be moored in a quiet, sheltered area free from extraneous forces such as propeller wash from passing vessels, or sudden discharges from shore side pumps, and in a manner that allows unrestricted heeling.
- c) The location of the test shall be chosen so that the density of water during the test is no greater than that on the route for which a vessel is to be certificated.
- d) The construction of vessels shall be complete in all respects.
- e) Ballast, where necessary, shall be on board and in place. Solid fixed ballast shall be stowed in a manner that prevents shifting of the ballast and shall be installed to the satisfaction of the Administration.

²⁶Section 4.6 of IMO's Model safety regulations for inland vessels in Africa & MSN 1823 Annex 7

- f) Each fuel and water tank shall be approximately three-quarters full.
- g) A weight equal to the total weight of all passengers, crew, and other loads permitted on a vessel shall be on board and distributed so as to provide normal operating trim and to simulate the vertical center of gravity causing the least stable condition that is likely to occur in service. For this purpose, the crew shall be counted as passengers. If a vessel carries passengers on diving excursions, the total weight of the diving gear shall be included in the loaded condition.
- h) The heel of a vessel prior to the commencement of the stability proof test shall not exceed 2 degrees.
- i) Unless otherwise specified, weight and vertical center of gravity shall be as follows:
 - 1. The weight of primary lifesaving equipment shall be simulated at its normal location, if not on board at the time of the test.
 - 2. Passenger numbers are allocated on a basis of 0.3 m² per passenger for the clear deck area. Clear Deck area excludes any fixtures that reduce the deck area available to standing passengers. Where permanently fitted seating is present, the area taken up by the seating is subtracted from the clear deck area and the number of seats added to the passenger allocation for that deck. If the seating is in the form of benches, the number of passengers is to be calculated by dividing the length of the bench in mm by 460 and rounding to the nearest integer passenger value.
 - 3. The weight of one person shall be taken as 75kg except that where a vessel operates exclusively on sheltered waters or when passenger loads invariably consist of a mix of adults and children, the weight of one person may be taken as 65kg; and
 - 4. The vertical center of gravity of standing passengers shall be assumed to be 760 mm above the relevant deck. For seated passengers the vertical centre of gravity is taken as 300 mm above the seat base²⁷.
 - 5. Any form of weights may be used where the mass is known or can be checked using a suitable weighing device. Care shall be taken when using sandbags or similar where moisture ingress may have a significant effect on their weight. The use of people for performing heeling tests is not permitted due to safety and accuracy considerations.
- j) On vessels having one upper deck available to passengers above the main deck, the vertical weight distribution shall not be less than the following:

Weight on Upper Deck = (Number of passengers located on upper deck) x (weight per passenger) x 1.33

Weight on Main Deck = Total Test Weight - Weight on Upper Deck

- k) On vessels where more than one deck is available to passengers above the main deck the vertical weight distribution used for the calculations shall be approved.

²⁷ MSN 1823 Annex 7

- l) All non-return closures on cockpit scuppers or on weather deck drains shall be kept open during the test.
- m) Guidance on the conduct of the stability proof test and the associated calculations is given in **Annexure 2**.

Stability and freeboard requirement

- a) The heeling moments to be applied in order to demonstrate the stability of vessels by means of calculation or a stability proof test shall be the greater of:

2. $M_p = (W) \times (B_p)/6$; and²⁸

3. $M_w = P \times A \times H$

Where:

M_p = passenger heeling moment (kg-m);

W = the total passenger weight using 75 kg per passenger or, where the vessel operates exclusively on sheltered waters, or when passenger loads invariably consist of a mix of adults and children, the weight of one person may be taken as 65kg

B_p = the maximum transverse distance (m) of a deck that is accessible to passengers;

M_w = heeling moment (kg-m);

P = wind pressure taken as 17.12 Kg/m² for operation on sheltered waters²⁹;

A = area (m²) of the projected lateral surface of the vessel above the waterline, including each projected area of the hull, super structure and area bounded by railings and structural canopies.

And

H = height (m) of the Centre of area (A) above the waterline, measured up from the waterline.

- b) In a stability proof test the moment determined in accordance with a) above shall be applied by means of a weight or weights placed at a transverse distance from the centerline of a vessel so that the product of the weight(s) and distance(s) is equal to the required moment.

²⁸It is assumed that 2/3 of the passengers will move to one side while the rest 1/3 will move to the other side (ref IS 12267-Part 1)

²⁹MSN 1823 (MCGA)

- c) When a vessel is subjected to this heeling moment, the heel shall be less than 10^0 .
- d) The immersion of the loading mark shall not exceed 50% of the freeboard or one-eighth of the breadth of the vessel measured at the point of minimum freeboard whichever is lesser and in any case not less than 76 mm.
- e) Where during stability proof test a vessel fails to meet the requirements of c) or d), the entire test shall be repeated with a reduced load equivalent to a reduced number of passengers or a reduced weight of cargo or by utilizing any other corrective measures available to enable the vessel to meet the requirements of c) or d).

Maximum number of passengers

- a) The maximum number of passengers permitted on passenger vessels shall be the least number permitted by any of the following criteria or combination of these criteria:
- b) Number shown by calculation or by means of a stability proof test, as appropriate, that results in a minimum freeboard meeting the requirements of 5.2 c) & d). Or
- c) Length of Rail - one passenger may be permitted for each 760mm of rail space available to the passengers at the periphery of the deck, not including rail space in congested areas, on stairways and where persons standing in the space would block the vision of the vessel's operators. Or
- d) Requirements in accordance with section 6B.8 (carriage of passengers of inland mechanically propelled vessels) of GO 26. Or
- e) One passenger may be permitted for each square meter of free deck area available for the passengers' use. Free deck area does not include:
 - 2. Concession stands, fixed tables, fixed gambling equipment and similar furnishings;
 - 3. Toilets and washrooms;
 - 4. Companionways and stairways;
 - 5. Spaces occupied and necessary for handling lifesaving equipment or line handling gear or in way of sail booms or running riggings;
 - 6. Spaces below deck which are unsuitable for passengers or which would not normally be used by passengers;
 - 7. Interior passageways less than 760 mm wide and passageways on open deck less than 460 mm wide;
 - 8. Bow pulpits, swimming platforms and areas which do not have a solid deck, such as netting on multi-hull vessels; and
 - 9. Aisle area.

Fire Fighting appliances

The following provisions are considered as suitable for existing inland passenger vessels operating in rivers, lakes, reservoirs etc. instead of rules framed under part C of GO 26

All inland vessels should be provided with the following type of fire appliances:

Fire Axe, Fire Buckets and Sand box

- a) Fire Axe: At least one in every vessel exceeding 15 meters in length
- b) Fire Buckets: At least one for each number of the crew with the minimum of two. Fifty percent of those buckets are to be fitted with lanyards. No vessels need carry more than 20 buckets.

Portable Fire Extinguishers

Portable fire extinguishers shall be provided on board vessels as follows:

Length	Extinguisher Type
Less than 10 m	1 x 4 liter chemical foam
10 m to less than 12.5 m	1x 4 liter chemical foam 2x 5 kg dry powder
12.5 m to less than 15 m	4 x 9 liter chemical foam 5 x 5 kg dry powder
15 m and above	4x 9 liter chemical foam 6x 5 kg dry powder

- a) All portable fire extinguishers shall conform to IS 15683 or equivalent.
- b) Non-Portable Foam Type Fire extinguishers. In case of motor vessels exceeding 30-meter length at least one. Capacity of such extinguishers shall not be less than 45 liters and shall conform to IS 16018 or equivalent.

Responsibility of Master/Owner

The master of all inland vessels shall ensure that the vessel is provided with appliances and equipment for fire fighting and for protection from danger or explosion in accordance with these rules and that the crew of the vessel are well conversant with the use of these appliances.

Approval of competent authority

If in any case the inland vessel is unable to comply fully with the requirements set out as above, and for vessels exceeding 45m in length, Or 150 ton gross, the appliances to be provided are to be referred to the competent officer for approval.

Life Saving Appliances

Life Rafts

GO 26 Part D section 6D.4.1 requires that IV passenger vessels are equipped with sufficient number of life rafts or buoyant apparatus to accommodate 100% of passengers and crew on board. Life rafts when not released manually are normally released with a Hydrostatic Pressure Release unit which is designed operate at water depths between 1.5 and 4.0 m. Thus considering the height of the uppermost deck of a vessel where the life rafts are stowed, the minimum water depth required for release of the life rafts may be at least 10 m. In inland waters such as rivers, reservoirs and lakes, vessels should use the most appropriate life saving appliance or equipment to achieve evacuation. Open Reversible Inflatable life rafts provide such a safe evacuation platform and may be specified if required.

Buoyant Apparatus

The provision of buoyant apparatus or lifebuoys is to provide some temporary support for those persons who may enter the water because they were unable to successfully take advantage of the dry-shore evacuation facilities if available. In this event, buoyant apparatus would give those passengers in the water something to hold on to until they could transfer to a life raft or until assistance arrives.

Personal Life-saving appliances

Personal life saving appliances shall be provided to protect all persons on board should they be required to abandon the ship. Life-saving appliances shall also be provided that will enable the ship's crew to contact emergency services in an emergency situation.

Summary:

- a) Life-saving appliances and equipment shall be provided in accordance with table below.

SI.NO	REQUIREMENT	ACTUAL	REMARKS
1	Life Saving Appliances Plan OR Safety Equipment Plan	Physical Inspection	Record of LSA equipment may be maintained
2	Sufficient number of life rafts or buoyant apparatus to accommodate at least 100% number of passengers and crew on board.	1 number open reversible inflatable life raft (ORIL) or buoyant apparatus for 100% passengers	Desired but if not available exemption may be given.
3	One life jacket each for 100% of passengers and crew on board.	YES	
4	Life jacket for child, for 10% of total number of persons certified to carry	YES	

5	At least four lifebuoys for vessels up to 25 meter length, six life buoys for vessel 25-45 meter length and 8 life buoys more than 45 meter length. At least two of the life buoys shall be with buoyant line of 30m in length.	YES	
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- b) The Administration may approve the fitting and the design and construction of lifeboats, life rafts, open reversible life rafts, flotation devices, buoyant apparatus and lifebuoys as appropriate, depending on the size and service characteristics of vessels and the areas within which they are certificated to undertake voyages, proximity of the proposed routes to rescue facilities and prevailing weather conditions, in order to provide an appropriate level of safety for survivors.
- c) Unless otherwise approved by the Administration, vessels 30 m and above in length shall be fitted with life rafts or open reversible inflatable life rafts and vessels less than 30m in length shall be fitted with flotation devices.
- d) ORIL provided in compliance with this section shall comply with the requirements of the Annex 11 of the IMO High Speed Craft Code, 2000 as amended, or Non-SOLAS Reversible rafts & any other relevant ORIL standards may be considered on application to the Administration.

Navigation & Communication

- a) Passenger vessels operating in sheltered waters such as rivers, lakes and reservoirs regardless of length, shall carry radio apparatus capable under normal conditions of transmitting and receiving, on frequencies designated by the Administration, over a distance of 50 nautical miles. This apparatus shall consist, at least, of VHF set either fixed or portable operating at least on Channel 16 or a mobile phone may be used as alternate means of communication.
- b) An inclinometer may be installed at the steering station so that the Master/helmsman is aware of the list /heel at all times.

Manning:

- a) While the manning requirements are specified in Chapter 4 of GO 26, the existing boats were operated with personnel with certificates issued by irrigation department. These operators will need to be reassessed and be issued a COC in accordance with GO 26. An up gradation course framework will need to be developed for issuing the COC's. This will take some time and till such a time the existing experienced personnel with Irrigation department and port department Licenses can be permitted to operate the boats as follows:
- b) Passenger boats: 1 Serang / Tindal, 1 Driver and 3 Helpers

- c) Launches: 1 Serang, 1 Driver and 2 helpers
- d) All the crew should have at least 2 years experience in the operation of these boats. Crew experience must be verified by the old endorsements done by the irrigation department on the certificates.

R. KARIKAL VALAVEN
SPECIAL CHIEF SECRETARY TO GOVERNMENT

SECTION OFFICER